

REMARKS/ARGUMENTS

Reconsideration of the application is once more requested.

Claims 8-12 and 14-16 are now in the application. Claims 8-12, 14 and 15 remain unchanged. Claim 16 has been added.

The new claim 16 is largely identical with claim 8, but delineates the process parameters and the resulting product parameters with more specificity. Two issues have once more been emphasized:

1. The first pressing step results in a height of the elevations that exceeds the height of the final product by at least 10%.
2. The second pressing step not only reduces the height of the elevations but also increases the angle of inclination of the elevations as compared with the inclination that results from the first pressing step. Increasing the inclination angle, of course, is equivalent to “flattening” the ramps of the elevations.

This brings us to the objection to claim 8. It is quite surprising that the Examiner objects to the claim at this stage of prosecution. The objected-to expressions, namely the angle α' and the angle α , indeed lie at the very heart of the rejection and applicants' contention that the claims should be patentable. If anything, the objection leads us to believe that the Examiner may not have understood the claimed invention and that the continued rejection is but based on an incorrect reading of the claims. Claim 8, as written, is correct. The same applies to claim 16.

The parameters of the final product are written without the prime. That is, the final height of the elevations is identified "h" and the intermediate height of the elevations resulting from the first pressing step is identified "h'." The angle of inclination of the elevations in the final product is identified "α" while the intermediate angle of inclination, following the first pressing step, is identified "α'."

Continuing with the "inclination" argument, we strongly question the Examiner's use

of the secondary reference Koga in the rejection. Koga states the angle of

inclination of the protrusions is preferably between 91° and 100°. This is nothing

more than a very basic teaching concerning the draft angle of a die mold.

Depending on the material being molded, the draft angle must always exceed 90°

so that the product may be safely ejected. As a rule of thumb, 0.5° is considered a

minimum and several degrees may be utilized, as long as the resulting product is

not adversely affected. Here, of course, Koga's protrusions may have any

inclination angle. A preferable range is 91° - 100°. In an alternative embodiment,

the draft angle may even be set to 105° (Fig. 6).

As previously stated, Fig. 6 of Koga illustrates an alternative (!) embodiment with an

increased angle of inclination, relative to the other embodiments. There is nothing

in the reference that would suggest a first pressing step with a given draft angle

that is followed by a second pressing step with an increased draft angle (relative to

the first draft angle).

The Examiner is respectfully requested to revisit the first five lines on page 4 of the

latest Office action. We agree with the interpretation that Koga does indeed

disclose certain draft angles of his dies and the resulting product, and we also

agree with the statement that Koga would invite any of a variety of angles of inclination. We do not agree, however, that this has any bearing on the question at hand. The secondary reference simply does not suggest the two-step pressing sequence with the inclination angles as claimed.

According to the secondary reference Koga, the protrusions (6a) are either formed by way of the plate insert 2 of Figs. 1 and 5 or by way of the plate insert 2 of Fig. 6. The former plate has straight bores 2a (with a slight draft angle, as noted above), while the latter has inclined, conical bores 2a. The two embodiments represent alternatives. There is nothing in Koga – nor in any other reference, for that matter – that would suggest two different angles of inclination for the protrusions to be formed in two different pressing steps.

Claims 8 and 16 call for a second pressing step in which “the angle of inclination [of the elevations is] increased” relative to an angle of inclination formed in the first pressing step. The prior art does not disclose such a process sequence.

We now refer to the Examiner’s refusal to accept the declaration by Dr. Sigl (the “Sigl Declaration) because, allegedly, the declaration “relies largely upon opinion instead of facts.” Office action, p. 6, bottom. This is the very essence of an expert opinion. Dr. Sigl is established as an expert (items 1-5) in the pertinent field. As such, Dr. Sigl is preeminently qualified to provide “expert opinions.” If the Examiner accepts Dr. Sigl as an expert (we request an advisory in that regard), then the opinions provided by Dr. Sigl must be accepted as facts or in lieu of facts. The Examiner is requested to reconsider the Sigl Declaration.

In previous submissions we had repeatedly argued that the production of mold components from graphite powder is possible only with methods that cannot be compared with production techniques known from conventional ("classical") powder metallurgy.

The production of complex moldings in conventional powder metallurgy requires that the powder mixture is first produced with a small amount of pressing aids (typically in the form of a wax) and the mixture is then pressed in dies at a very high pressure in a range of 200 to 1000 MPa. Then the intermediate product, which has a consistency similar to chalk, is sintered at a temperature just below the melting point of the highest melting component and for a long period of time (up to one hour or even more). The part is thereby solidified and rendered largely tight.

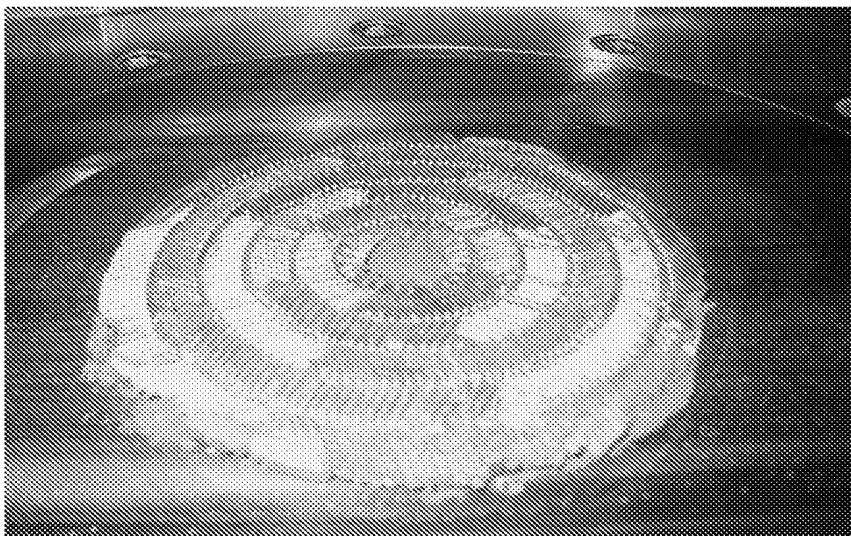
We contrast this with the production of moldings from graphite powder. The references Yoshida and Koga represent such technology. There, the graphite powder is mixed with a large content of heat-curing resin (10-40% by weight), which renders the mixture flowable and formable. Most importantly, however, the resin is cured upon further processing, which provides the rigidity and the carrier matrix for the final product. Yoshida, col. 7, lines 5 et seq.

After the mixture is pressed in a matrix press at much lower pressures as compared with the powder metallurgy process (2-10 MPa in a first press and 10-100 MPa in a second press) – Yoshida, col. 6, lines 46 et seq. – and heated in the matrix to 150 – 170° for curing the resin, the process is finished. No sintering at high temperatures is required, as it is required in the context of the powder-metallurgical processes.

Besides, such sintering would not be possible, because the resin would vaporize and the molding would become useless because it would be entirely porous.

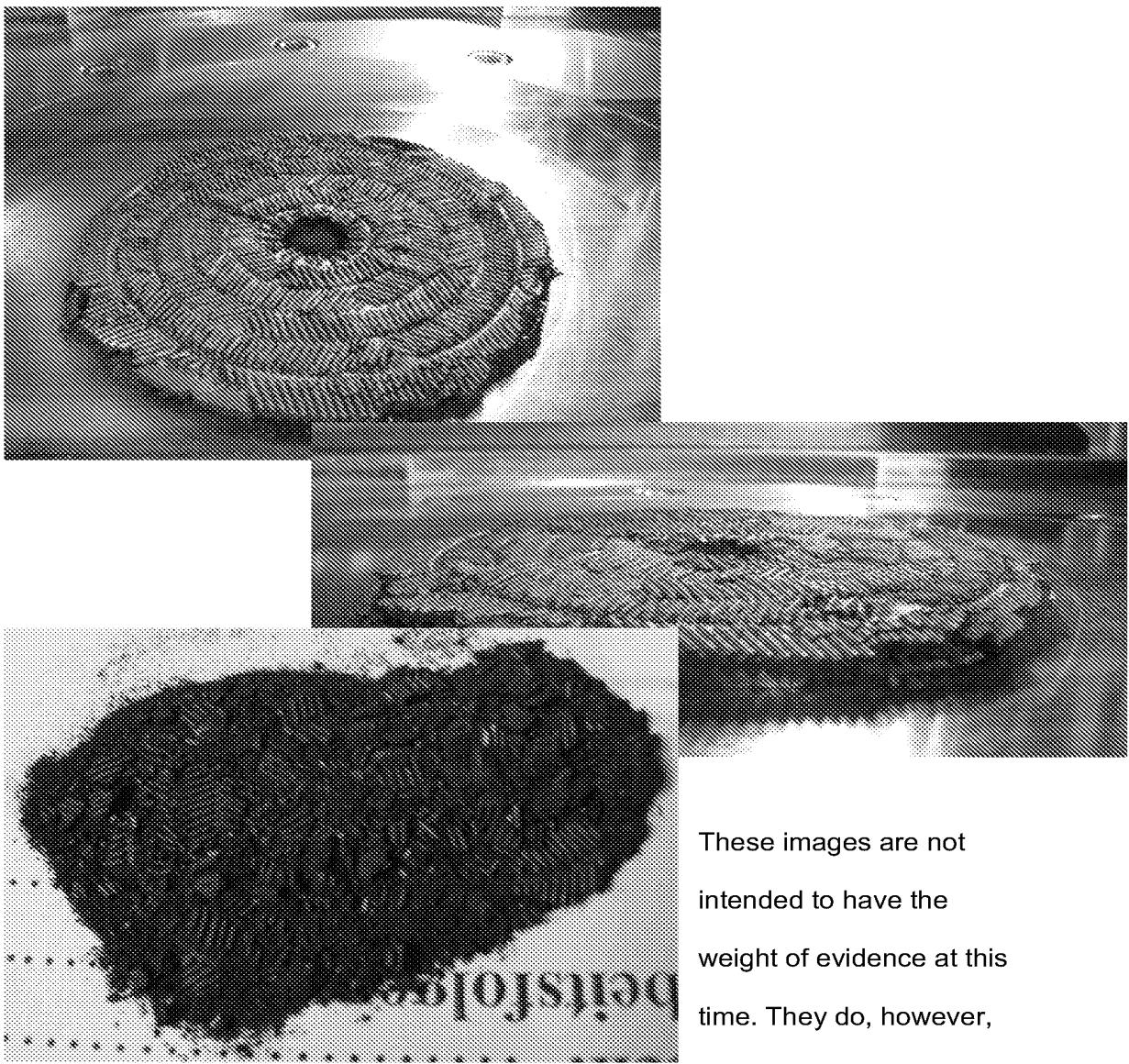
This foregoing juxtaposition clearly shows that the two processes – the production of moldings from graphite powder as opposed to the production of moldings from metal powders – are very different. A person of skill in the art of powder metallurgy would not look to processes and methods known in the production of graphite powder separators and to apply such to the production of separators from chromium alloys.

Applicants attempted to follow the process as apparently suggested by the rejection. Applicants performed an experiment in which separators were to be formed from graphite powder. In the setup, we used pressing aids in a proportion that is similar to that of the claimed invention. Here, we added 1% by weight of



micro-wax and
pressed the
mixture at the
molding
pressures of
approx. 800 MPa
and in the same
mold presses as
are used in the

claimed process. The resulting “product” consisted in a useless pile of powder, as shown by the following photographs.



These images are not intended to have the weight of evidence at this time. They do, however, underscore applicants'

continued contention that the two processes are simply not comparable. The rejection is based on a questionable foundation in that the Examiner has freely used information gathered from the references that pertain to graphite powder processing and applied the same to a field that pertains to powder-metallurgical processing. A person of skill in the art would not agree, as clearly supported, also, by the Sigl Declaration, of record.

In view of the foregoing, reconsideration and the allowance of claims 8-12 and 14-16 are solicited.

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